

LISTING OF THE CLAIMS

 X This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (Original) A controller comprising a device having a body portion and four and only four arms extending from the body portion which is adapted to support the controller, the arms being spaced from one another in three dimensions and the device having six or more degrees of constraint, tip portions of each of the arms engaging in connection means providing restricted relative motion, the connection means being attached to a gripping means which can receive and transmit an applied force and/or torque in a three dimensional sense, the controller including response detection means for monitoring responses in at least three of the four arms to provide an output signal representative of a three-dimensional force and/or a three-dimensional torque applied to the gripping means.
2. (Original) A controller as defined in claim 1, wherein the response detection means has means for directly monitoring response in three and only three of the four arms and the device further comprises means for calculating from data representing the monitored response in the three arms the values of a response in the fourth arm.
3. (Currently Amended) A controller as defined in claim 1, and ~~wherein the controller is arranged to control~~ further comprising a system with connected to receive the output signal and to be controlled.
4. (Currently Amended) A controller as defined in claim 1 ~~or claim 2~~, wherein the arms are arranged in a tetrahedron shaped envelope and are almost equally mutually spaced in a symmetrical sense with a small degree of non-symmetry to provide pre-loading at the connection means.

5. (Currently Amended) A controller as defined in ~~any one of the preceding claims~~ claim 1, wherein the ~~arms are constrained such that the device~~ has structure to provide has eight degrees of constraint to the arms.
6. (Currently Amended) A controller as defined in ~~any one of the preceding claims~~ claim 1, wherein the tip of each arm has a portion with a substantially part-spherical profile and is slidable along a cylindrical bore associated with the connection means and the arm is rotatable relative to the axis of the bore.
7. (Currently Amended) A controller as defined in ~~any one of the preceding claims~~ claim 1, wherein each of the response detection means includes a plurality of optical sensors each of which has an emitter and a detector, the optical sensors being arranged substantially in the same plane and having respective optical axes transverse to the axis of the associated arm.
8. (Original) A controller as defined in claim 7, incorporating a total of 6 optical sensors disposed in pairs around three of the four arms.
9. (Original) A controller as defined in claim 1, and including a total of eight sensors provided in an array so that displacements in an X-Y set of responses for each of the four arms is achieved giving eight readings which can be resolved to give the required output signal.
10. (Original) A computer system comprising a controller including four and only four arms extending from a body portion which is adapted to support the device, the arms being spaced from one another in three dimensions and the device having six or more degrees of constraint, tip portions of each of the arms engaging in connection means providing restricted relative motion, the connection means being attached to a gripping means which can receive and transmit an applied force and/or torque in a three dimensional sense, the device including response detection means for monitoring responses in at least three of the four arms to provide an output signal representative of a three-dimensional force and/or a three-dimensional torque to the gripping means, the output signal being arranged to control the computer system.

11. (Original) A computer system as defined in claim 10, wherein the response detection means has means for directly monitoring response in three and only three of the four arms and the device further comprises means for calculating from data representing the monitored response in the three arms the values of a response in the fourth arm.
12. (Currently Amended) A computer system as defined in claim 10 ~~or claim 11~~, wherein the arms are arranged in a tetrahedron shaped envelope and are almost equally mutually spaced in a symmetrical sense with a small degree of non-symmetry to provide pre-loading at the connection means.
13. (Currently Amended) A computer system as defined in ~~any one of claims 10-12~~ claim 10, wherein the ~~arms are constrained such that the~~ device has structure to provide eight degrees of constraint to the arms.
14. (Currently Amended) A computer system as defined in claim 13, wherein the tip of each arm has a portion with a substantially part-spherical profile and is slidable along a cylindrical bore associated with the connection means and the arm is rotatable relative to the axis of the bore.
15. (Currently Amended) A computer system as defined in ~~any one of claims 10-14~~ claim 10, wherein each of the response detection means includes a plurality of optical sensors which are concentric and disposed on the same plane.
16. (Original) A computer system as defined in claim 15, incorporating a total of 6 optical sensors disposed in pairs around three of the four arms.
17. (Currently Amended) A controller comprising four and only four operative arms extending from a body portion which is adapted to support the controller, the arms being spaced from one another in three dimensions and the device having six or more degrees of constraint, tip portions of each of the arms engaging ~~in connection~~ connectors means providing restricted

relative motion, ~~the connection means~~ and being attached to a ~~gripping means~~ hand grip which can receive and transmit an applied force and/or torque in a three dimensional sense, the controller including response ~~detection~~ detectors ~~means~~ for monitoring directly responses in at least three of the four arms to provide an output signal representative of a three-dimensional force and/or a three-dimensional, torque applied to the ~~gripping means~~ hand grip and the device further comprising means for establishing the response in each of the four arms for computing the output signal, ~~calculating from representing the monitored response in the three arms the values of a response in the fourth arm, and wherein~~ the controller further comprising an output signal connector for connection to a system to be controlled is arranged to control a system with the output signal, and wherein the arms are arranged ~~in~~ within a tetrahedron shaped envelope and are almost equally mutually spaced in a symmetrical sense with a small degree of non-symmetry to provide pre-loading at the connection means, ~~wherein~~ and the arms are constrained such that the device has eight degrees of constraint.

18. (Currently Amended) A computer system having software for control by a spatial controller, and further comprising a spatial controller comprising four and only four arms extending from a body portion which is adapted to support the controller, the arms being spaced from one another in three dimensions and the device having six or more degrees of constraint, tip portions of each of the arms engaging in connection means providing restricted relative motion, the connection means being attached to a gripping means which can receive and transmit an applied force and/or torque in a three dimensional sense, the controller including response detection means for monitoring responses in three of the four arms to provide an output signal representative of a three-dimensional force and/or a three-dimensional torque applied to the gripping means and the device further comprising means for calculating from ~~representing~~ the monitored response in the three arms the values of a response in the fourth arm, and wherein the controller is arranged to control the computer a system with the output signal, and wherein the arms are arranged in a tetrahedron shaped envelope and are almost equally mutually spaced in a symmetrical sense with a small degree of non-symmetry to provide pre-loading at the connection means, wherein the arms are constrained such that the device has eight degrees of constraint.